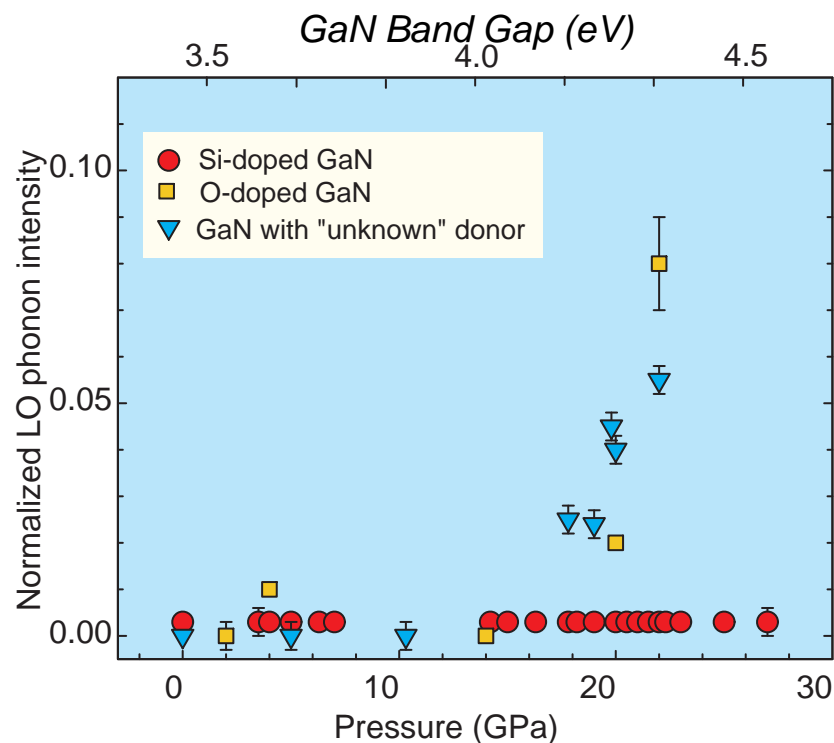
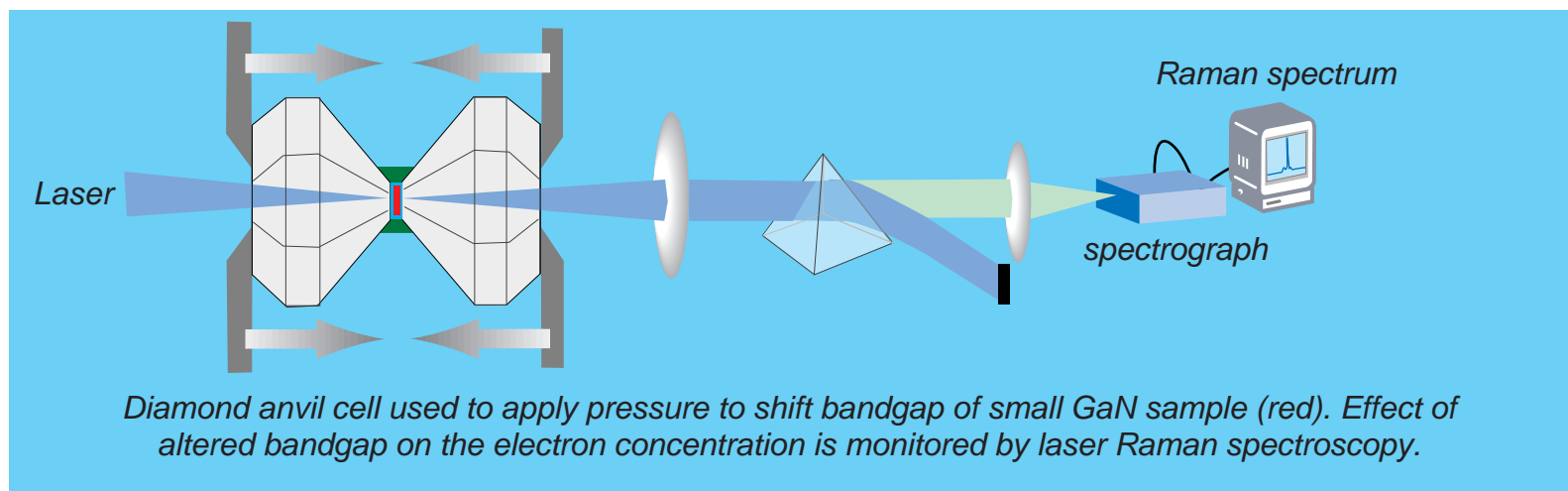


Oxygen Shown to Be "Mystery" Donor in GaN

High Pressure Experiments Resolve Long-Standing Controversy



Raman spectral analysis—Certain vibrations of the GaN crystal (LO phonons) interact with free electrons and do not exist at high electron concentration. The LO phonon signal is low in Si-doped material (red) and does not change with pressure, indicating constant, high electron concentration. In O-doped material, the LO phonon intensity increases dramatically at 20 GPa (yellow), indicating a pressure induced drop in the electron concentration. Experimental samples with unexpected electron concentrations (n-type character) show a similar pressure dependence (blue), implicating O as the electron donor.